

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Kenneth C. Johnson et al.

Application No.: NEW

Filed: HERewith

For: DATABASE INTERPOLATION METHOD  
FOR OPTICAL MEASUREMENT OF  
DIFFRACTIVE MICROSTRUCTURES

Group Art Unit: Unknown

Examiner: Unknown

**INFORMATION DISCLOSURE  
STATEMENT**121 Spear Street, Suite 290  
San Francisco, CA 94105  
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## M/S PATENT APPLICATION

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

Applicant(s) submit(s) herewith patents, publications or other information [attached hereto and listed on the attached Form PTO-1449 (modified)] of which they are aware, which they believe(s) may be material to the examination of this application and in respect of which there may be a duty to disclose in accordance with 37 CFR § 1.56.

## This Information Disclosure Statement:

- (a) ☒ accompanies the new patent application submitted herewith. 37 CFR § 1.97(a).
- (b) ☐ is filed within three months after the filing date of the application or within three months after the date of entry of the national stage of a PCT application as set forth in 37 CFR § 1.491.
- (c) ☐ as far as is known to the undersigned, is filed before the mailing date of a first Office Action on the merits, or before a first office action after filing a Request for Continued Examination under §1.114.
- (d) ☐ is filed after the first office action and more than three months after the application's filing date or PCT national stage date of entry filing but, as far as is known to the undersigned, prior to the mailing date of either a final rejection or a

notice of allowance, whichever occurs first, and is accompanied by either the fee (\$180) set forth in 37 CFR § 1.17(p) or a certification as specified in 37 CFR § 1.97(e), as checked below.

- (e) ☐ is filed after the mailing date of either a final rejection or a notice of allowance, whichever occurred first, and the Issue Fee has not been paid, and is accompanied by the fee (\$130) set forth in 37 CFR § 1.17(i)(1) and a certification as specified in 37 CFR § 1.97(e), as checked below. This document is to be considered as a petition requesting consideration of the information disclosure statement.

[If either of boxes (d) or (e) is checked above, the following "certification" under 37 CFR § 1.97(e) may need to be completed.] The undersigned certifies that:

- (f) ☐ Each item of information contained in the information disclosure statement was cited in a communication mailed from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement.
- (g) ☐ No item of information contained in this information disclosure statement was cited in a communication mailed from a foreign patent office in a counterpart foreign application or, to the knowledge of the undersigned after making reasonable inquiry, was known to any individual designated in 37 CFR § 1.56(c) more than three months prior to the filing of this information disclosure statement.

A list of the patent(s) or publication(s) is set forth on the attached Form PTO-1449 (Modified).

A copy of the items on PTO-1449 (Modified) is supplied herewith, except as noted below.

Those patent(s) or publication(s) which are marked with an asterisk (\*) in the attached form PTO-1449 (Modified) are not supplied because they are (a) either U.S. Patents and this an application filed after June 30, 2003, or (b) were previously cited by or submitted to the Office in a prior application no. 09/927,177, filed August 10, 2001, and relied upon in this application for an earlier filing date under 35 U.S.C. § 120.

A concise explanation of relevance of the items listed on form PTO-1449 (Modified) is:

- (k) ☒ not given
- (l) ☐ given for each listed item

- (m) ☐ given for only non-English language listed item(s) [Required]
- (n) ☐ is in the form of an English language copy of a Search Report from a foreign patent office, issued in a counterpart application, which refers to the relevant portions of the references [copy attached].

The Examiner is reminded that a "concise explanation of the relevance" of the submitted items "may be nothing more than identification of the particular figure or paragraph of the patent or publication which has some relation to the claimed invention," MPEP § 609.


While the information and references disclosed in this Information Disclosure Statement may be "material" pursuant to 37 CFR § 1.56, it is not intended to constitute an admission that any patent, publication or other information referred to therein is "prior art" for this invention unless specifically designated as such.

In accordance with 37 CFR § 1.97(g), the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made or that no other material information as defined in 37 CFR § 1.56(a) exists. It is submitted that the Information Disclosure Statement is in compliance with 37 CFR § 1.98 and MPEP § 609 and the Examiner is respectfully requested to consider the listed references.

Respectfully submitted,

STALLMAN & POLLOCK LLP

Dated: February 12, 2004

By:  \_\_\_\_\_  
Michael A. Stallman  
Reg. No. 29,444

Attorneys for Applicant(s)

<b>INFORMATION DISCLOSURE CITATION</b> <i>(Use several sheets if necessary)</i>	<b>Docket Number (Optional)</b> <b>TWI-30510</b>	<b>Application Number</b> <b>NEW</b>
	<b>Applicant(s)</b> <b>Kenneth C. Johnson et al.</b>	
	<b>Filing Date</b> <b>HEREWITH</b>	<b>Group Art Unit</b> <b>Unknown</b>

### U.S. PATENT DOCUMENTS

*EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE
	*AA	4,689,754	08/25/1987	Collins et al.	702	32	02/21/1985
	*AB	4,757,207	07/12/1988	Chappelow et al.	250	491.1	03/03/1987
	*AC	4,885,709	12/05/1989	Edgar et al.	364	563	01/16/1987
	*AD	5,262,635	11/16/1993	Curbelo	250	214R	05/12/1992
	*AE	5,315,513	05/24/1994	Abreu et al.	702	3	10/29/1991
	*AF	5,428,558	06/27/1995	Cahill et al.	356	319	12/17/1993
	*AG	5,488,476	01/30/1996	Mansfield et al.	356	512	10/12/1994
	*AH	5,502,799	03/26/1996	Tsuji et al.	345	600	05/14/1993
	*AI	5,523,840	06/04/1996	Nishizawa et al.	356	355	06/21/1994
	*AJ	5,607,800	03/04/1997	Ziger	430	8	02/15/1995
	*AK	5,867,276	02/02/1999	McNeil et al.	356	445	03/07/1997
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	*AN	5,963,329	10/05/1999	Conrad et al.	356	372	10/31/1997
	*AO	5,993,386	11/30/1999	Ericsson	600	300	07/15/1997
	*AP	6,037,614	03/14/2000	He et al.	257	184	03/06/1998
	*AQ	6,242,739	06/05/2001	Cherkassky	250	339.11	04/19/1999
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	*AT	6,485,872	11/26/2002	Rosenthal et al.	430	30	11/22/2000

### FOREIGN PATENT DOCUMENTS

	REF	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	*AU	EP 72367 A	02/1983	EPC	G01B	15/02		
	*AV	EP 324490 A	07/1989	EPC	A61N	05/06		
	*AW	JP 08015036 A	01/1996	Japan	G01J	05/00		
	*AX	WO 99/45340	09/10/1999	PCT	G01B	11/02	X	

### OTHER DOCUMENTS

*(Including Author, Title, Date, Pertinent Pages, Etc.)*

	*AY	G.H. Schut, "Review of Interpolation Methods for Digital Terrain Models," <i>The Canadian Surveyor</i> , Vol. 30, No. 5, December 1976, pp. 389-412.
	*AZ	W.S. Russell, "Polynomial Interpolation Schemes for Internal Derivative Distributions on Structured Grids," <i>Applied Numerical Mathematics</i> , Vol. 17 (1995), pp. 129-171.
	*BA	Book, <i>Numerical Recipes in C++ - The Art of Scientific Computing</i> , Second Edition, Cambridge University Press (2002), pp. 126-132.
	*BB	Printout, "GeoComputation 99 - What's the Point? Interpolation and Extrapolation with a Regular Grid DEM," (1999), 17 pages in length.
	*BC	<i>IBM Technical Disclosure Bulletin</i> , "Spectroscopic Pitch Measurement Technique," September 1989, pp. 391-392.
	*BD	<i>IBM Technical Disclosure Bulletin</i> , "Phase-Sensitive Overlay Analysis Spectrometry," March 1990, pp. 170-174.
	*BE	D.M. Haaland et al., "Partial Least-Squares Methods for Spectral Analyses - 1. Relation to Other Quantitative Calibration Methods and the Extraction of Qualitative Information," <i>Anal. Chemistry</i> , Vol. 60, No. 11, June 1, 1988, pp. 1193-1202.

Examiner	Date Considered
<b>Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP Section 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</b>	

<b>INFORMATION DISCLOSURE CITATION</b> <i>(Use several sheets if necessary)</i>	<b>Docket Number (Optional)</b> <b>TWI-30510</b>	<b>Application Number</b> <b>NEW</b>
	<b>Applicant(s)</b> <b>Kenneth C. Johnson et al.</b>	
	<b>Filing Date</b> <b>HEREWITH</b>	<b>Group Art Unit</b> <b>Unknown</b>

**U.S. PATENT DOCUMENTS**

*EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE
	*BF	6,541,287	04/01/2003	Ino et al.	438	16	03/03/1999
	*BG	6,542,829	04/01/2003	Gupta	703	33	09/21/2000
	*BH	2002/0005957	01/17/2002	Finarov et al.	356	630	08/31/2001
	*BI	2002/0033945	03/21/2002	Xu et al.	356	369	09/21/2001
	*BJ	2002/0192847	12/19/2002	Ino et al.	438	14	07/29/2002

**FOREIGN PATENT DOCUMENTS**

	REF	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO

**OTHER DOCUMENTS**

*(Including Author, Title, Date, Pertinent Pages, Etc.)*

	*BK	R.H. Krukar et al., "Using Scattered Light Modeling for Semiconductor Critical Dimension Metrology and Calibration," <i>SPIE</i> , Vol. 1926 (1993), pp. 60-71.
	*BL	C.J. Raymond et al., "A Scatterometric Sensor for Lithography," <i>SPIE</i> , Vol. 2336 (1994), pp. 37-49.
	*BM	C.J. Raymond et al., "Metrology of Subwavelength Photoresist Gratings Using Optical Scatterometry," <i>J. Vac. Sci. Technology B</i> , Vol. 13, No. 4, July/Aug. 1995, pp. 1484-1495.
	*BN	M.R. Murnane et al., "Scatterometry for 0.24 $\mu\text{m}$ - 0.70 $\mu\text{m}$ Developed Photoresist Metrology," <i>SPIE</i> , Vol. 2439 (1995), pp. 427-436.
	*BO	M.R. Murnane et al., "Subwavelength Photoresist Grating Metrology Using Scatterometry," <i>SPIE</i> , Vol. 2532, (1995), pp. 251-261.
	*BP	C.J. Raymond et al., "Multi-Parameter Process Metrology Using Scatterometry," <i>SPIE</i> , Vol. 2638 (1995), pp. 84-93.
	*BQ	J. Bischoff et al., "Photoresist Metrology Based on Light Scattering," <i>SPIE</i> , Vol. 2725 (1996), pp. 678-689.
	*BR	C.J. Raymond et al., "Multi-Parameter CD Measurements Using Scatterometry," <i>SPIE</i> , Vol. 2725 (1996), pp. 698-709.
	*BS	C.J. Raymond et al., "Scatterometry for CD Measurements of Etched Structures," <i>SPIE</i> , Vol. 2725 (1996), pp. 720-728.
	*BT	B.K. Minhas et al., "Towards Sub - 0.1 $\mu\text{m}$ CD Measurements Using Scatterometry," <i>SPIE</i> , Vol. 2725 (1996), pp. 729-739.
	*BU	J. Bischoff et al., "Light Scattering Based Micrometrology," <i>SPIE</i> , Vol. 2775 (1996), pp. 251-259.
	*BV	X. Niu, "Specular Spectroscopic Scatterometry in DUV Lithography," <i>SPIE</i> , Vol. 3677 (1999), pp. 159-168.
	*BW	J. Allgair et al., "Manufacturing Considerations for Implementation of Scatterometry for Process Monitoring," <i>SPIE</i> , Vol. 3998 (2000), pp. 125-134.
	*BX	L. Li, "Formulation and Comparison of Two Recursive Matrix Algorithms for Modeling Layered Diffraction Grating," <i>Journal of the Optical Society of America</i> , Vol. A 13, No. 5, May 1996, pp. 1024-1035.
	*BY	<u>Handbook of Optics</u> , 2nd Edition, Vol. 2, <i>Optical Society of America</i> (1995), Chapter 22 entitled "Polarimetry," pp. 22.1-22.37.
	*BZ	<u>Handbook of Optics</u> , 2nd Edition, Vol. 2, <i>Optical Society of America</i> (1995), Chapter 27 entitled "Ellipsometry," pp. 27.1-27.27.

<b>Examiner</b>	<b>Date Considered</b>
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